

Problem n.1

The file `pollution.txt` reports the measurements of two air pollutants (PM2.5 and PM10) collected in 100 days by an air-quality monitoring site of a Chinese city.

- a) Perform a statistical test at level 5% to verify if the mean of the two air pollutants is significantly different from (50,50). Verify the assumptions required to perform the test and provide the p-value.
- b) Find an elliptical confidence region at level 95% for the mean value of the two air pollutants. Provide a plot and report: the analytical expression of the region, its centre, the direction and the length of the principal axes of the ellipse.
- c) Does the vector (50,50) lies within or outside the region identified at point b)? Comment the answer highlighting the connection to the conclusion of point a).
- d) Provide two T^2 simultaneous confidence intervals (global confidence 95%) for the mean of PM2.5 and the mean of PM10.